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TITLE: Subscriber line interface circuit for serving ISDN subscribers using echo cancellers and POTS subscribers

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A subscriber line interface circuit includes a switched hybrid circuit operable during a POTS mode when the associated subscriber is using a POTS station and in an ISDN mode when the subscriber is using an ISDN station. The hybrid circuit includes a first amplifier circuit for coupling a signal at the two-wire port thereof to its four-wire transmit port, and a second amplifier circuit for coupling a signal at the four-wire receive port of the hybrid to the two-wire port. A high termination impedance is synthesized at the two-wire port during the POTS mode and a low termination impedance at the two-wire port during the ISDN mode. The signal from the four-wire transmit port is converted to a digital signal and applied to a digital signal processor which is configured differently according to DSP running programs respectively stored in first and second memories for operations during the POTS and ISDN modes. The DSP processes signals received from the hybrid's four-wire transmit port as well as from the telephone switching system according to the program supplied from the first or second memory and applies the process signals to the switching system and the four-wire receive port.

According to the present invention, there is provided a subscriber line interface circuit for a digital telephone switching system serving both ISDN (Integrated Services Digital Network) subscriber stations having an echo canceller and POTS (Plain Old Telephone Service) subscriber stations. The SLIC comprises a switched hybrid circuit operable during a POTS mode when an associated subscriber is using a POTS subscriber station and an ISDN mode when the associated subscriber is using an ISDN subscriber station, the switched hybrid circuit having a two-wire port coupled to the line loop of the associated subscriber, a four-wire receive port and a four-wire transmit port. The hybrid circuit includes a first amplifier circuit for coupling a signal at the two-wire port to the four-wire transmit port, and a second amplifier circuit for coupling a signal at the four-wire receive port to the two-wire port. A high termination impedance is synthesized at the two-wire port during

the POTS mode and a low termination impedance at the two-wire port during the ISDN mode. An A/D converter is coupled to the four-wire transmit port of the hybrid circuit for converting analog signals therefrom to digital signals and a D/A converter is coupled to the switching system for converting digital signals therefrom into analog signals and applying same to the four-wire receive port of the hybrid circuit. A digital signal processor is provided for receiving digital signals from the A/D converter and pulse code modulation signals from the switching system, processing the received signals according to a program supplied thereto and applying a processed version of the signals from the A/D converter to the switching system and a processed version of the signals from the switching system to the D/A converter. A first memory stores a first program for configuring the digital signal processor to effect balancing network computation and codec filter computation during the POTS mode and a second memory stores a second program for configuring the digital signal processor to effect echo canceller computation and equalization decision computation during the ISDN mode. Means are provided for causing the switched hybrid circuit and the first and second memories to be switched from the POTS mode to the ISDN mode.

Digital circuit 2 includes an analog-to-digital converter 50 for providing analog-to-digital conversion and output signals from operational amplifier 22. The output of A/D converter 50 is supplied to a digital signal processor 51 of known design such the ones available under the product serial number .mu.PD-7720. Read-only memories 52 and 53 are provided for respectively storing programs for operating digital signal processor 51. The program stored in ROM 52 is to be used when the SLIC is operated in POTS mode by configuring the DSP to provide balancing network computations, codec filter computations and PCM encoding and decoding functions, while the program stored in ROM 53 is to be used when the SLIC is operated in the ISDN mode by reconfiguring the DSP to operate essentially as an echo canceller and an equalization decision circuit. A selector 54 is provided to respond to the changeover-to-ISDN command signal by switching the DSP configuration from the POTS to the ISDN mode by enabling ROM 53 and disabling ROM 52.